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A Bifurcated Antenna in the Soldier Beetle, *Chauliognathus pennsylvanicus* (Coleoptera: Cantharidae)

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Developmental anomalies of the insect antenna are apparently rare in wild populations. Although certain mutations affecting the development of the antennae of Drosophila (i.e., thread, aristaless, and the homeotic mutation aristapedia) are well known, literature reports of such abnormalities in nature are infrequent. Park (1928, 1931, 1932) has described a number of anomalous conditions in beetles, including bifurcation of the antenna in *Balaninus,* and Bateson (1894, from Park, *op. cit.)* has listed a number of other distortions affecting the antennae. Park *(1928)* has summarized the literature of teratological antennae which appeared prior to 1928.

The present report concerns a single specimen of *Chauliognathus pennsylvanicus* DeG., collected at Camp Kiwanis North, near Des Plaines, Cook County, Illinois on August 6, 1951. This specimen has a bifurcated right, and a normal left antenna. After this beetle was collected many more were examined in the field for antenna! bifurcation but none showed the abnormality, although more than 200 individuals were seen. Figure 1 shows the right antenna of this specimen. The basal seven segments (counting the scape, the minute segment distal to the scape, and the minute third segmer t distal to the scape) are normal when compared with the left antenna. The eighth is the bifurcated segment showing a U-shaped structure with one arm slightly shorter than the other. The five terminal segments of one branch are normal (the lower branch on Fig. 1), on the second branch these segments are all abnormal. Basally the ninth segment of the abnormal branch is much narrower than normal; it bends sharply at about one quarter of its length, and terminates in a knob, considerably larger than the distal end of the normal segment. The distal half of segment 10 is flattened, as are all

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of segments 11, 12, and 13. Segment 9 is about normal in length; the remainder are all shorter. The distal four segments of this branch show areas of differential coloration which appear much like unsclerotized material.

Abnormalities of this type are probably explicable on the basis of injury to the pupa during formation of the antennal bud of the imaginal disk. Such an injury could be mechanical in nature (Park, 1928), although cold and heat (Goldschmidt, 1938), and perhaps chemical changes also, could be involved.

It is of interest to speculate on the time of such an injury. In view of the fact that the normal number of segments is present in both the normal left antenna and the two branches of the right, it seems probable that the injury took place before the organizing substances controlling the development of the antenna had laid down the basic pattern of development of the distal portion of the antenna, and that such substances were produced in sufficient quantities (or at sufficient rates) to produce a partially normal development of the terminal segments. As Goldschmidt *(op. cit.)* has pointed out, symmetry is probably the result of the equal distribution of growth substances to the two sides of the developing bilaterally symmetrical organism. Asymmetry, presumably, is due to the unequal diffusion of these substances. In the present case the right side of the animal probably exerted greater demands upon such substances by virtue of the presence of the extra branch. These materials must have been produced at velocities rapid enough to control normal development in the left antenna, the basal portion of the right, and the distal segments of the normal branch of the right, but either because of the inhibition of their diffusion or of their presence in quantities subliminal to the demands of the additional substrate, development was abnormal in one branch of the right antenna. A similar explanation may be applicable to the *Balaninus* described by Park (1928) in which one branch is normal and the other only partially so.

Anomalies of this type may, perhaps, also be explained on the basis of mechanical injury later on in development. With regard to his teratological *Balaninus,* Park (1928, p. 219) suggests the possibility of a longitudinal incision of the structure. Such an incision followed by healing, perhaps as late as the callow, might produce abnormalities as extreme as bifurcation of a structure.*

*Since this note was written Dr. Robert S. Howard has informed me (personal communication) that he has not been able to produce antennal bifurcation in *Tenebrio* by incising the callow or late pupal antenna.

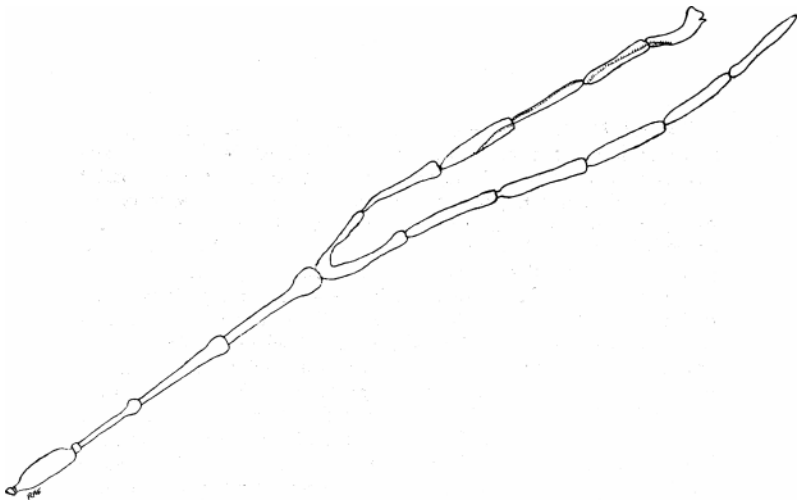

Figure 1. The bifurcated right antenna of a specimen of *Chauliognathus pennsylvanicus* DeG. Setae have not been indicated.

I am indebted to Dr. George H. Mickey and Dr. Orlando Park for suggestions on the preparation of this note, and to the latter for assistance in the identification of the beetle. The specimen is to be deposited in the Division of Entomology, Chicago Natural History Museum.

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